Remarks by

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When I was here in June of 1972, I gave you a progress report on what had happened in the space program during my first year as NASA Administrator. I said then that we had defined a new long-range national space program for the decade of the Seventies that will be as challenging, as exciting, and as rewarding as our space achievements in the last decade, but less costly.

Sixteen months later, that optimistic statement holds up very well. For example, since I spoke to you last:

... We have completed the Apollo program, which is universally recognized as a brilliant technological and scientific achievement.

... Our amazing spacecraft Pioneer 10 is approaching the giant planet Jupiter, and is expected to send back color images of Jupiter and one of its moons.

... We have flown two crews in highly successful Skylab missions, and are now preparing to send up the third crew. This will give us an unprecedented opportunity to observe the large comet Kohoutek as it comes close to the Sun and lights up the sky in December and January.

... We are witnessing a rapid expansion in the use of satellites in Near Earth Orbit, especially for communications. For example, NASA has requests from seven companies, or groups of companies, to launch 16 satellites for domestic communications here in the United States or in Canada over the next 2 years.

... We have launched our first Earth Resources Technology Satellite (ERTS-1) and successfully operated it for more than 14 months, with much more significant results than we had expected.

... Congress has again given a strong bipartisan vote of approval for the Space Shuttle program, which is our bid to open up Near Earth Space for practical benefits in the same way that the covered wagon and the railroads opened up the American West in the 19th century.

... And we are working on a number of new projects to transfer space technology to use in other fields, including projects to make automobile engines run cleaner and on less fuel, and to protect the environment.

I would like to expand on several of these points, beginning with our current efforts to explore the planets.

Although we are concentrating on activities in Earth orbit in this decade, we certainly have no intention of neglecting the planets, where we can learn so much about the past and future of the solar system, and indeed get a much better understanding of planet Earth and its atmosphere.

Pioneer 10 will pass by Jupiter in early December of this year. If Pioneer performs as expected, and sends back data over half a billion miles, the results should be very exciting. I hope you will have the opportunity to follow them closely. We also have a second spacecraft under way toward Jupiter -- Pioneer 11, which is now passing through the dangerous asteroid belt, and will fly by Jupiter in December of 1974.

In 1977 we will launch two larger and more complex Mariner-type spacecraft to fly by both Jupiter and Saturn.

In early November of this year we will launch a Mariner spacecraft on an unprecedented mission in toward the Sun, flying first by Venus, using the gravity of Venus to gain extra speed, and then flying quite close to the planet Mercury -- as close as 600 miles if all goes well. If launched on schedule, this Mariner will pass Mercury during April of next year. It will be the first spacecraft to use the gravity of one planet to speed on to another, and the first to get a close-up look at Mercury. The view of Mercury seen through Earth-based telescopes does not tell us much.

Surface details of the planet Mars are now well known, thanks to the thousands of photographs sent back in 1972 by Mariner 9. Mariner 9 was the first spacecraft from Earth to go into orbit around another planet (not counting the Moon as a planet). When it arrived at Mars late in 1971 a gigantic dust storm was raging, and the planet was obscured. But because Mariner 9 was in orbit, it was able to wait out the dust storm and get excellent pictures of the Mars surface. It was also able to make unexpected and very valuable observations on the dynamics of the dust storm while it waited.

Mars turned out to be much more interesting than we had thought. The Mariner pictures showed volcanic mountains higher than any on Earth, and a canyon several thousand miles long and deeper than the Grand Canyon on Earth. The presence of water on Mars was also indicated in some of the pictures.

The Russians succeeded in soft landing a TV camera on Mars in 1971, but it functioned for less than a minute and returned no useful pictures because of the dust storm.

The Russians have four spacecraft now on the way to Mars. Two of them are expected to send down landers when they reach Mars in 1974.

We have launched no spacecraft to Mars this year, but will be well prepared for the next opportunity, or "launch window" as it is called, which will be in 1975. We will launch two large Viking spacecraft to Mars in 1975, and each of them will send down a landing capsule weighing more than a ton, including fuel to provide braking power. Each of these Mars landers is expected to send back TV pictures and search for signs of life. Our landings will take place in mid-summer of 1976, and it is possible that one of them will occur on the Fourth of July, when we celebrate the 200th anniversary of American independence.

We are also participating in a promising scientific program with the Germans to send two Helios spacecraft close to the Sun in 1974 and 1976. When I say close, I mean within about 28 million miles, which is about three-tenths of the distance between Sun and Earth. This is much closer than any scientific spacecraft has ever come to the blazing center of the solar system.

These are all very interesting and potentially rewarding expeditions. We have no approved planetary missions after 1977, but these will be developed as we begin to get back results from current missions to Jupiter and Mercury and the Viking landings on Mars.

I would like to come back to the Pioneer 10 flight to Jupiter for a few moments because this is a current mission of great potential interest, and because it is a transportation story of the first magnitude.

Pioneer 10 was launched on March 3, 1972. It left the Earth at 32,000 miles per hour, faster than any man-made object had ever flown before. If the Apollo astronauts could have travelled that fast, they could have reached the Moon in 11 hours instead of 3 1/2 days. Pioneer 10 has been underway for 18 1/2 months and has covered nearly half a billion miles.

If Pioneer 10 is not destroyed by the radiation from Jupiter, or trapped by its gravity field, it will continue outward from the Sun and about 14 years from now it will cross the orbit of Pluto and leave the solar system forever to wander through the star systems of the Milky Way galaxy. We have a plaque on board which is Pioneer 10's calling card in case it is ever intercepted by intelligent beings. The plaque displays drawings of two human figures, a sky map showing Pioneer's point of origin, and other coded messages which could probably be readily understood by any beings advanced enough to capture our spacecraft.

Pioneer 10 is also a remarkable communications story. It is not a big spacecraft to begin with. It weighed only 568 pounds when launched, so the allowance for communications equipment, power sources, and antennas was quite limited.

Pioneer 10 carries radio isotope thermoelectric generators as its primary source of electrical power. Pioneer travels too far from the Sun to use solar panels to produce power. So necessity becomes a mother again, and produces the radio isotope thermoelectric generator! Pioneer's radio signals will start from the vicinity of Jupiter with a strength of eight watts. Not kilowatts. Eight watts. Travelling at the speed of light they will still take 45 minutes to reach the tracking stations of NASA's Deep Space Network.

By the time Pioneer's signals reach Earth, they will be decreased in strength to only a tiny fraction of a watt. But we are well prepared for that. Our very large parabolic antennas, 210 feet in diameter, can pick up signals from Pioneer as weak as one quintillionth of a watt. If you could collect that amount of energy for 19 million years, it would light a small Christmas tree bulb for only a fraction of a second. Still, NASA's Deep Space Network stations in Australia and Spain and at Goldstone, California, expect to pick up these weak signals and convert them into useful data, including some color images of Jupiter.

I find these figures impressive; but I cite them for you to make another point. They illustrate how "way out" assignments like exploring the planets force technological progress and help fill the nation's reservoir of new technology.

If tiny Pioneer 10 is able to send back useful new information about Jupiter or any of its 12 satellites, it will be one of the great scientific and engineering achievements of this century. Yet Pioneer 10 is only the beginning of a long quest for knowledge that will eventually lead men to land on one of the moons of Jupiter sometime during the 21st century.

Professor Hannes Alfven, a recent Nobel prize winner, thinks that Jupiter and its satellites may indeed be a small solar system of their own. Whether that is true or not remains to be seen. But it is certain that we can learn a great deal about the origin of our Sun and its planets by close-up study of Jupiter and its moons.

Now, with the approach of Pioneer 10, that close-up study of Jupiter is about to begin.

I regret that we will probably have to wait until the 21st century to send an expedition to land on one of the moons of Jupiter.

Meanwhile, back in Earth orbit, we have important work to do in this decade. Even as we prepare to explore the famous rings of Saturn, we are establishing useful spacecraft rings about the Earth.

We have moved forward rapidly with three classes of satellites in Earth orbit. They are communications satellites; Earth observation satellites; and scientific satellites which look out into the universe.

I would like to use the available time today to bring you up-to-date on one of these -- the Earth Resources Technology Satellite, or ERTS-1.

Thousands of scientists and public officials and industry representatives around the world are busy today scanning the images that ERTS produces. Hundreds of valuable uses for this type of information have already been identified, and more are being discovered all the time.

There is not time to even begin to tell what ERTS can do or how it does it. But I would like to make several general points:

ERTS is the product of many technological advances. We have a spacecraft in precise orbit that takes readings on every point on the entire Earth repetitively every 18 days. Sensors have been developed that reveal much more than an ordinary color photograph would show. And what the sensors see is designed for computer processing so that relevant information -- and only relevant information -- can be delivered routinely and rapidly to the people who interpret and use it.

This wealth of new information, reduced to readily usable form at nominal cost, comes at a time when it is urgently needed. It is needed for better management of natural resources. It is needed to monitor air and water pollution on a global scale. It is needed for better urban and regional planning. It is needed to check on the health of our forests and of grain crops around the world, to estimate the moisture content of soils, and to predict the water supplies available in the snow cover of remote mountains. In short, it is needed to flash the red warning lights on the control panels of spaceship Earth; and the green lights of progress, too.

Skylab, our first manned space station, is also demonstrating what trained observers with even more sophisticated and specialized instruments can do as weather watchers, Earth observers, and astronomers.

Since we have both ERTS-1 and Skylab in orbit at the same time, we are getting an excellent demonstration of what automated spacecraft can do in space compared with what men can do. The answer so far is what we had expected. For the foreseeable future, we will need both manned and automated spacecraft.

The automated spacecraft will make the routine, repetitive observations. Men will be needed to help develop and test new instruments for the automated satellites; to operate instruments which cannot be automated at reasonable cost; and to take advantage of unusual opportunities that only the intelligence of man can recognize.

Everything that has happened on Skylab, from the health of the astronauts to their performance as astronomers and repairmen, has demonstrated the value of developing large multi-purpose manned space stations for the future.

Needless to say, we have been tremendously pleased by the results from the second manned Skylab mission, which ended last Tuesday. It will take years for scientists to analyze all the pictures of the Sun and observations of the Earth the Skylab crew brought back with them. But already this 59-day mission in Earth orbit is being hailed as one of the most significant scientific ventures of all times.

One young scientist remarked that there is enough data to analyze from the solar telescope on Skylab to last him the entire remainder of his career!

As you know, the second Skylab crew spent 59 days in orbit, more than doubling the record set by the first Skylab astronauts.

The second crew was hampered by motion sickness for their first two or three days in orbit, but after this rocky start their health and performance was excellent throughout the mission. They were able to do much more work than had been assigned them, and kept asking for more. For example, they put in 305 hours observing the Sun compared with 200 hours in the flight plan. And they were able to carry out 39 passes over selected areas of Earth, compared with 26 passes called for in the plan. Incidentally, in their 59 days in space they travelled 24 million miles.

Even the Sun has cooperated with Skylab. This was supposed to be the quietest portion of the 11-year solar cycle, but flares, bubbles, holes, and many other dynamic changes within the Sun were observed and photographed by the astronauts.

As seen through the Skylab telescopes, the Sun is a very mobile, dynamic, boiling, bubbling star. With the Skylab instruments we are finally able to begin focusing in on what actually makes the Sun work, and what causes the sudden changes in it from time to time which affect our lives on Earth.

One solar upheaval the astronauts witnessed threw out a great mass of material having several times the weight of Earth and containing as much energy as the Earth's population could use in 500 years at current rates.

The next Skylab mission -- and the last one -- is scheduled to be launched November 11. It is scheduled for 56 days, but might run longer if there is good reason to do so.

This schedule will give the third Skylab crew the unprecedented opportunity to study the Comet Kohoutek in late December and early January. The appearance of this large, bright Comet at this time when Skylab is still flying is a most fortunate happening for the scientists of the world.

Time and again in Apollo and Skylab we have seen how great an advantage it is to have the human mind on the scene in space or on the Moon to make judgments, to observe what instruments cannot see, to respond to unexpected developments, and to take corrective actions when necessary.

This week NASA is celebrating its 15th anniversary. NASA opened for business just 15 years ago, on October 1, 1958. It is most fitting that we have the highly successful and rewarding Skylab missions as a capstone to those first 15 years. In this time, we have put 250 payloads into orbit, and I believe the Skylab flight just completed will prove the most rewarding of them all, from a scientific standpoint.

Skylab marks the transition of the U. S. space program from the period dominated almost entirely by exploration to one now dominated by peaceful exploitation of the space around us as a global resource of mankind. To me this is Skylab's most important lesson. We have demonstrated that no longer can space be written off as a vast emptiness. Space is a place of high value, a new and unique resource that can be used from this time forward for the benefit of people everywhere on Earth. Simply stated, it provides an unmatched vantage point from which we can look outward towards the Sun and stars and all the mysteries of the universe, and from which we can also look inward toward the Earth to gather information that it is impossible to gather, in a reasonable time span, from any place on Earth or in the air.

As we at NASA look ahead to the next 15 years of the U. S. space effort, we can expect to see more advanced space laboratories in regular use, based in many ways on what we are now learning from Skylab.

Just last week I had the opportunity to participate in a ceremony which greatly advances the cause of international cooperation in space. For the United States I signed an agreement with the European Space Council under which nine countries of Western Europe will develop the Spacelab module for use with our Space Shuttle in the 1980s and 1990s.

Spacelab is the name we and the Europeans have adopted for the reusable laboratory which can be loaded aboard the Space Shuttle and taken to orbit for periods of one to three weeks. It will provide instruments and working space in what we call a "shirtsleeves environment" for as many as 12 scientists. The cost of developing the Spacelab, which the European countries will pay for, is estimated at between $300 and $400 million.

Now, to sum up this report to you on the New NASA Space Program for the Seventies, as I see it today, let me say:

-- We are making good progress in all important areas.

-- So far as funding goes, we are lean but healthy; undernourished perhaps, but not starved.

-- We are doing more in this decade, for less, because we could build on the capabilities created in the Sixties.

-- We are now at work on plans for the new programs we will need to start later in this decade.

-- And we have developed an enormous bank of new technology which is gradually being put to use in the general economy, as well as into the next generation of space missions. This new technology has moved into almost every industry and is being used in every segment of our society.